REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 2-14 and 16-19 are pending in the present application. Claims 1 and 15 are canceled and Claims 2-14 and 16-19 are amended by the present amendment.

Claims 2, 3, 5, and 8-13 are each amended to be in independent form and to recite the features of originally filed Claim 1, which is canceled. Claims 16 and 17 are each amended to be in independent form and to recite the features of originally filed Claim 15, which is canceled. Claim 19 is amended to recite the features of originally filed Claim 18. Claims 2-14 and 16-19 are also amended to correct minor inconsistencies. It is believed no new matter is added.

In the outstanding Office Action, the drawings were objected to; the specification was objected to; and Claims 1-19 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 5,978,029 to Boice et al. (herein "Boice").

Regarding the objection to the drawings, Figure 1 is amended to show the encoder parameter 134 arrow as an input into the quantization block 14, in light of comments in the outstanding Office Action and is also amended to correct a minor inconsistency in block 33. Accordingly, applicants respectfully request that objection be withdrawn.

Further, regarding the objection to the specification, the specification is amended to correct the minor inconsistencies noted in the outstanding Office Action. Accordingly, applicants respectfully request that objection also be withdrawn.

Claims 1-19 were rejected under 35 U.S.C. § 102(e) as anticipated by Boice. Applicants respectfully traverse that rejection.

Amended Claim 2 is directed to a video encoding apparatus that includes, *inter alia*, a setting unit configured to set a weight for a quantization step size for macro blocks of frames

to be encoded for each scene on the bases of a statistical feature amount relating to a distribution of luminance for each macro block. Amended independent Claims 16 and 19 include similar features but are directed to a video encoding method and a recording medium having a computer program for encoding an input video signal, respectively.

In a non-limiting example, FIG. 1 shows a video encoding apparatus and FIG. 5 shows a distribution of luminance within a macroblock of video in the encoding apparatus. A statistical feature related to the distribution of luminance determines the extent to which a portion of the macroblock with a large luminance variance is adjacent to a portion of the macroblock with a small luminance variance, thereby indicating the extent to which mosquito noise is likely to occur. In the macroblock of FIG. 5, if any of the four small blocks satisfies equation 3 at page 19 (i.e., mosquito noise more likely to occur), the quantization step size QP(j)_m is reduced by quantization step size weight q1, as shown at page 20, equation 4. Alternatively, if the four small blocks do not satisfy equation 3 at page 19 (i.e., mosquito noise less likely to occur), quantization step size QP(j)_m is increased by quantization weight factor q2, to prevent an increase in the number of generated bits, as shown at page 20, equation 5. Thus, the weight factor applied to the quantization step size is based on a distribution of luminance.

This apparatus advantageously improves the clarity of displayed objects in frames with strong edges or where mosquito noise is likely to occur.[1]

Applicants respectfully submit that Boice does not teach or suggest a setting unit that sets a weight for a quantization step size based on a distribution of luminance. Further, applicants respectfully traverse the statement in the outstanding Office Action that Boice includes setting a weight to a quantization step as in Claim 2.[2] Boice describes setting a picture quality threshold used to calculate a quantization parameter, based upon a running

[1] Specification at page 18, lines 19-24.
[2] Office Action mailed December 2, 2003, at page 4, lines 13-15.

average of picture quality calculations, which may include signal-to-noise ratio, average quality, average bits per picture, target bit rate, picture type, or average Mquant.[3] For example, Boice describes calculating a quantization parameter, Mquant, as the "most recent Mquant . . . plus the difference of a new average Mquant minus the previous average Mquant. The new average Mquant comprises an average Mquant averaged over the history of the pictures of the same picture types in the current scene up to and including the current picture to be encoded."[4] In other words, Boice discloses only determining a quantization parameter based upon an average picture quality, which is different than the claimed approach of setting a quantization weight based upon a distribution of luminance. Thus, it is respectfully submitted that Boice does not teach or suggest setting "a weight to a quantization step size for macro blocks of frames to be encoded for each scene on the bases of the statistical feature amount relating to a distribution of luminance for each macro block," as in independent Claims 2, 16, and 19.

Accordingly, it is respectfully submitted that independent Claims 2, 16, and 19 are allowable.

Amended Claim 3 is directed to a video encoding apparatus including, *inter alia*, a classification unit configured to classify the plurality of scenes into a plurality of scene types, based on the statistical feature amount relating to a motion vector, and a setting unit configured to set a weight to a frame rate and a quantization step size for each scene according to the scene type. Amended independent Claim 17 includes similar features but is directed to a video encoding method.

The non-limiting examples of FIGs. 4A-4E illustrate scene types with different motion vector content. For example, FIG. 4A illustrates a scene with only a few motion vectors (e.g., object moving across a fixed background) and FIG. 4B illustrates a scene with

[3] Boice at column 13, lines 15-22, column 13, lines 29-32, and column 15, lines 18-23.
[4] Boice at column 13, lines 51-57.

motion vectors of the same direction and magnitude (e.g., camera panning). Frame rate weight W_FR and quantization step weight W_QP are reduced for the scene in FIG. 4A, but those weights are increased for the scene in FIG. 4B, according to equation 1 at page 16 and equation 2 at page 17.

Applicants respectfully submit that Boice does not teach or suggest classifying scenes based on a statistical feature amount relating to a motion vector. Further, applicants traverse the statement in the outstanding Office Action that Boice discloses a classification unit configured to classify scene types at column 10, lines 40-60. Boice discloses only a fade detection, which determines the presence of a fade and the "direction" of the fade. According to Boice, the direction of the fade indicates whether the scene is dissolving into a fade, or a scene is crystallizing out of a fade, and is based upon a percentage of interpixel sums.[5] In other words, a fade determination is based upon changes in pixel values and is not based on motion vectors at all, as in the claimed approach. Thus, Boice does not teach or suggest classifying "the plurality of scenes into a plurality of scene types, based on the statistical feature amount relating to a motion vector," as in independent Claims 3 and 17.

Accordingly, applicants respectfully submit that independent Claims 3 and 17, and the claims dependent therefrom, are allowable.

Amended Claim 5 is directed to a video encoding apparatus including, *inter alia*, a feature amount computation unit to obtain a statistical feature amount from the number of motion vectors, a distribution of motion vectors, a vector size, a motion compensation residual error, and a luminance/chrominance variance.

Applicants respectfully submit that Boice does not teach or suggest each of the claimed statistical features and respectfully traverse the indication in the outstanding Office

[5] Boice at column 10, lines 44-46.

Action that each of these features is disclosed by Boice.[6] For example, Boice discloses only determining "[v]ariance of motion vectors (difference between neighboring motion vectors)"[7] and that inter-frame statistics include "(1) motion vectors."[8] However, Boice is silent regarding determination of a statistical feature amount from a number of motion vectors, a distribution of motion vectors, or a vector size. Thus, it is respectfully submitted that Boice does not teach or suggest a feature amount computation unit "configured to extract the number of motion vectors, a distribution of motion vectors, [and] a vector size," as in independent Claim 5.

Accordingly, it is respectfully submitted that independent Claim 5 and claims dependent therefrom are allowable.

Amended Claim 8 is directed to a video encoding apparatus that uses, *inter alia*, a frame rate as well as a quantization step or a bit rate as encoding parameters. Independent Claims 10 and 11 include a similar feature.

An example of an embodiment of the invention shown in Figure 1 includes a video signal 100 and a frame rate and bit rate 134 provided to encoder section 10. Encoder section 10 produces encoded output video 200. Thus, both frame rate and bit rate are employed as encoding parameters.

Applicants respectfully submit that Boice does not teach or suggest using both frame rate and quantization step or bit rate as encoding parameters. Boice only describes encoding a noisy macroblock by a high quantization value, QUANT, but does not teach the claimed encoding parameters.[9] Hence, Boice does not teach or suggest encoding the input video signal based on a frame rate and a quantization step size or a bit rate as in independent Claims 8, 10, and 11.

---

[6] Office Action mailed December 2, 2003, at page 4, lines 19-22.
[7] Boice at column 10, lines 11-12.
[8] Boice at column 12, line 14.
[9] Boice at column 11, lines 34-42.

In addition, Claim 11 also recites determining a quantization step size and an interval between frames to be encoded, using an occupancy of a virtual buffer. Boice describes using MB-AVACT and DFD to determine the quantization value for each macroblock as described in column 11, lines 5-50, but does not teach the above claimed features.

Accordingly, it is respectfully submitted that independent Claims 8, 10, and 11, and the claims dependent therefrom, are allowable.

Amended Claim 9 is directed to a video encoding apparatus that includes, *inter alia*, an encoding parameter correcting unit that corrects a bit rate for each scene as an encoding parameter for the purpose of encoding the input video signal to satisfy a target bit rate specified by a user.

Applicants respectfully submit that Boice does not disclose a target bit rate specified by a user, and thus does not teach or suggest the features of independent Claim 9.

Accordingly, it is respectfully submitted that independent Claim 9 is allowable.

Claim 12 is directed to a video encoding apparatus that includes, *inter alia*, a determination unit configured to determine a second frame as a delimiter for separating the scenes if a difference between a first frame and the second frame adjacent thereto exceeds a predetermined threshold and a difference between the first frame and a third frame also exceeds the threshold. Further, the determination unit fails to determine the second frame as the delimiter if the difference between the first frame and the second frame exceeds a predetermined threshold but the difference between the first frame and the second frame fails to exceed the threshold.

FIGs. 3A and 3B illustrate non-limiting examples of determining a scene separation. In the example of FIG. 3A a scene is separated at frame i+1 because large differences are found between frame i and frame i+1 as well as between frame i and frame i+2. Conversely, in the example of FIG. 3B, a scene is not separated because a difference between frame i and

i+1 is large but a difference between frame i and i+2 is small. Thus, as illustrated in these examples, determination of a scene separation is based on three frames, i, i+1, and i+2.

Applicants respectfully submit that Boice does not disclose a scene separation based on three frames. Boice discloses using two frames for determining a scene change, i and i-1.[10] Hence, Boice does not teach or suggest determining a scene change based on first, second, and third frames, as in Claim 12.

Accordingly, it is respectfully submitted that independent Claim 12 is allowable.

Amended independent Claim 13 is directed to a video encoding apparatus including, *inter alia*, a feature amount computation unit configured to compute motion vectors of macro blocks of each frame of the input video signal, a motion compensation residual error, and an average and variance of the luminance to obtain the feature amount.

Applicant respectfully submits that Boice does not describe features of Claim 13 and respectfully traverses the statement in the outstanding Office Action to that effect.[11] Column 10, lines 10-15 of Boice, referred to in the Action, merely describes that a "[v]ariance of motion vectors (difference between neighboring motion vectors)" is obtained. However, Boice does not teach or suggest "a motion compensation residual error, and an average and variance of the luminance to obtain the feature amount," as in Claim 13.

Accordingly, it is respectfully submitted that independent Claim 13 and Claim 14, which depends on Claim 13, are allowable.

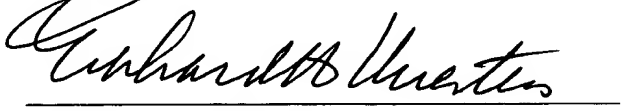
Accordingly, as discussed above, it is respectfully submitted that independent Claims 2, 3, 5, 8-13, 16, 17, and 19, and claims dependent therefrom, are allowable.

[10] Boice at column 10, lines 13-34.
[11] Office Action mailed December 2, 2003, at page 5, lines 13-15.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Eckhard H. Kuesters
Attorney of Record
Registration No. 28,870

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/03)

EHK:ZSS:dnf
I:\ATTY\ZS\20's\202\202461US\202461 AMENDMENT.DOC